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However, there is an unexpected advantage to recording the back image plane in scatterometry/spectroscopy. *This is because different points in the recorded back focal plane correspond to different angles of rays leaving the object.* Moreover, if Koehler illumination is used a further advantage is obtained because any non-specular scattered light will be detected at a different point in the detector array than specularly reflected light, making it incoherent relative to the light specularly reflected from the reference mirror. Thus, only specularly reflected light will survive the Fourier transform algorithm, allowing one to cleanly calculate the complex reflectance as a function of angle and wavelength from the data gathered by the camera as is shown in the current patent. This is a distinct advantage for film thickness and scatterometry measurements, and is not possible with the techniques of deGroot, Kim et al, or Davidson et al because they do not record images of the back focal plane. Further, while it may be obvious to improve the imaging of Davidson by using the frequency domain techniques of deGroot, there is no suggestion that the combination of references makes it obvious to either image the back focal plane or to use such an image for the purpose of determining specular reflection coefficients.

Finally, applicant has submitted the reference “Interferometric back focal plane microellipsometry” by Feke et al. in conformity with 37 CFR 1.97. A form PTO/SB/08B (08-03) is also enclosed. In the Feke et al. reference the back focal plane is illuminated by a coherent laser beam. This is distinct from the Koehler illumination recited in the claims. In conformance with 37 CFR 1.97(e) I certify that:

The Feke et al. reference was not cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge, after having made a reasonable inquiry, it was not known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement.

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Applicant respectfully submits that the claims of the present application clearly distinguish from the cited prior art, and that the cited prior art does not anticipate or even hint that the adaptation of an imaging system by illuminating the object with Koehler illumination and recording the image of the back focal plane makes it possible to develop an improved scatterometer. Accordingly, applicant requests the allowance of the claims as amended.

By:  12/27/2007
Michael L. Sherrard Date
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